



DEPARTMENT OF GENERAL SERVICES
E N E R G Y M A N A G E M E N T D I V I
S I O N

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March 21, 2002

Mr. Scott Tomashefsky
California Energy Commission
1516 Ninth Street, MS-4
Sacramento, CA 95814

Re: Docket Number: 99-DIST-GEN-(2)

Dear Mr. Tomashefsky

Attached are the comments of the Department of General Services regarding the questions and issues raised in the California Energy Commission's Committee Scheduling Order And Call For Additional Comments, dated February 21, 2002.

We appreciate the opportunity to offer these comments to the CEC in the preparation of a strategic plan for distributed generation.

If you have any questions, please contact Jonathan Teague at (916) 322-8808

Very truly yours,

JONATHAN M. TEAGUE
Manager, Electricity Services Program
Energy Management Division

Enclosure: DGS Response to Call for Additional Comments in 99-DIST-GEN-(2)

Department of General Services Response to Call for Additional Comments in 99-DIST-GEN-(2)

Deployment Issues and Opportunities

Interconnection Issues

- Can interconnection rules be standardized across California?
In terms of safety requirements and the development of a uniform business environment for DG, rules should be standardized. Details surrounding equipment specifications should also be clear and standardized because that would allow potential distributed generators and the utilities to be confident that a project will be completed safely and successfully. Variations in the topology and equipment of each of the utility distribution systems may be a source of varying needs, but regulatory agencies and distribution companies should move expeditiously to create uniform system standards so that all of the equipment on the customer side of the Point of Common Coupling (PCC) can be standard.
- Should California support development of national interconnection standards?
This is highly desirable in order to achieve advantageous economies of scale in the development of DG. This is essential in order to promote market development and a uniform business environment for maximum competition in this industry.
- Can interconnection be made more user-friendly to the end-use consumer?
- Can a substantial amount of DG be interconnected in both radial and networked distribution systems?
- Are there safe, reliable and cost-effective interconnection solutions for radial and networked distribution systems?

To answer these questions, the CEC can look to its own DG case study report authored by Onsite Energy Corp. This kind of interconnection issue is addressed in the section on the benefits that distributed generation provides to the utilities. The situation that results from an overabundance of distributed generation in a given area may be controlled best through the use of the microgrids, which Chris Marnay from the Lawrence Berkeley National Laboratory described at the February 5, 2002 workshop. At the policy level the question is whether the system needs dispatch control over the dispersed generation, or whether it can operate as an "energy highway" with a multitude of independent actors connected to it.

Environmental Issues

- Should the state give preference to "clean" DG technologies?
It is state policy to support clean, renewable and environmentally benign sources of electricity. Emphasizing clean technologies is essential in order to eliminate or minimize human exposure to emissions from distributed generation. Accordingly, such technologies should be given preference.
- Can air emissions from DG become as clean as central power plants by 2007?
Certain DG technologies are inherently clean in operation, requiring no emissions monitoring or active emissions controls in order to maintain their cleanliness; photovoltaic generation and certain fuel cell technologies are examples. Such systems obviate the need for ongoing environmental inspection and monitoring. These systems are already cleaner than central station thermal generation plants; in fact, the primary environmental

issue with such facilities is how to capture the economic benefits of their minimal emissions profiles.

- Can air emissions from diesel backup generators become as clean as natural gas-fired generators?
The CEC itself has funded some research into retrofit type emissions controls. The issue here is that technologies that require active emissions control systems in order to achieve low emissions rates also will require active monitoring and regulatory enforcement to ensure the continuing and long term effective operation of such control systems. Currently, regulatory agencies lack the necessary resources to undertake expanded responsibilities for inspection and enforcement of emissions limits on future DG systems, thereby creating a risk of excessive emissions in the event of control systems failure or deterioration, with the attendant risk of impacts to public health.

There may be exhaust treatment retrofits or combustion management technologies that can improve the emissions profiles of diesel engines in DG applications, and such measures should be promoted, especially for emergency and standby generation facilities for which these engines are well suited. Nevertheless, the regulatory enforcement issue of ensuring continued operational effectiveness of such emissions control measures must be addressed prior to further deployment of diesel ICE DG for routine baseload or load-following applications.

Grid Effects Issues

- Would a high penetration of DG have a beneficial /detrimental impact on the T&D system?
The actual impacts of high levels of penetration of DG will depend upon the nature of the systems interconnected to the grid, the operational mode (e.g., baseload vs. peaking), the size and the degree of dispersion of the interconnected DG capacity, and perhaps other factors. For example, a large number of small solar PV installations at customer sites could result in substantial peaking capacity in aggregate but with little actual impact other than reduced loads on the system from displaced customer load. Benefits could include enhanced voltage support at the distribution level. In assessing the potential impact, some assumptions need to be made about the nature of the interconnection hardware and protective devices that are to be employed; the CEC should assume that interconnected DG will meet all currently adopted standards.
- Is there a limit to the level of DG that the grid can absorb without adverse impacts?
The issue of what level of DG "the grid" can absorb without adverse impacts is tied to the question of what operational paradigm is selected for the grid. As presently configured and operated, there are most likely upper limits on any particular distribution circuit for how much DG can be interconnected before protective limits are exceeded. This circumstance need not impose an absolute limit on the ultimate extent or capacity of DG deployment; rather it indicates the need to continually enhance and evolve the nature of the distribution system itself.
- Are there any limits on bi-directional power?
Similarly, the limits on bi-directional power on a particular circuit or on the system as a whole will change in response to alterations or improvements to the system. The condition and operating limits for existing protective devices on the distribution system will strongly condition how much bi-directional power is tolerable for safe and reliable system operations at any particular location. What needs to be addressed is how the system can be developed to accept and capitalize on the benefits of dispersed generation resources.

- Should the distribution design philosophy and design tools be modified to accommodate DG?
Changes in distributed generation technologies require concurrent changes in distribution system design. Whether DG installations of the future are situated on the customer side of the meter or placed under utility control, similar issues of system topology and operations will arise. System design issues can either thwart or promote the development and market growth of advanced DG technologies. Developing a system design that includes provisions for emergency operational control and coordinated dispatch should be a key element in the strategic plan for DG.
- Can engineering studies be eliminated, standardized, or streamlined?
Given the site specific nature of many aspects of the electricity distribution system, some need for engineering studies is likely to remain, depending upon the nature and scale of DG deployment. DGS expects that the adoption of uniform interconnection standards and designs should greatly reduce the need for routine studies.
- Can microgrids be effectively utilized?
Customers should have the option to develop and utilize microgrids, while meeting all relevant interconnection standards and requirements for tying in to the larger grid. The development of campuses, complexes of buildings, industrial parks, and planned unit developments all afford the opportunity for rational and efficient deployment of microgrids using clean and renewable distributed generation. This pattern of energy network development would facilitate the deployment of combined heat and power systems, greatly enhancing the overall efficiency of primary energy use.

Market Integration and Regulatory Issues

- Can market rules be modified to allow DG to better participate in current markets?
Yes, market rules can be modified or preserved to foster the deployment of DG. Rules propounded by the California Independent System Operator are a case in point. In particular, the state should reject CA ISO's proposed requirement to meter gross loads and gross generation behind the customer-utility interface. This requirement will impose unnecessary costs on existing and future grid connected DG. In addition, the assessment of grid management charges and transmission access charges against gross generation of DG ignores the physical reality of power flows from customer DG to customer loads and treats the energy as if it was provided over the high voltage transmission grid.
- Can transaction costs associated with interconnecting and permitting be reduced?
The proposed decision on Interconnection fees in R.99-10-025 suggests the establishment of tracking accounts by the investor owned utilities for interconnection costs; DGS supports this proposal. This would allow for an objective determination of what utility costs are actually incurred as a starting point for evaluating what costs for utility interconnection of DG are reasonable. Permitting costs charged by local authorities can be minimized by the development of standard permitting packages in conjunction with increasing levels of education and experience on the part of local permitting officials with the installation of DG projects.
- Is it in the State's interest to promote DG?
Yes, the state will benefit from the creation of a more stable and secure electricity generation resource mix that DG offers. Promotional efforts could include education and information for local permitting officials (as above), adoption of statewide standards for DG construction, permitting and interconnection (including in municipal utility jurisdictions), sponsorship of testing and demonstration programs for DG, and legislative and regulatory incentives such as net metering for renewable DG and buy-down programs.

- How can tariffs and rates be designed to provide better price transparency to DG?
Price transparency for DG is affected by rates and tariffs in a number of areas, including: charges for energy (net metering); standby charges; and development costs (interconnection charges).

Net metering of DG installations affords a simple and transparent form of ratemaking in terms of energy consumed for DG, but this is likely to prove controversial and may require additional legislation to implement.

The determination of standby rates is crucial to the development of DG, because as these rates increase, the incentive to install DG decreases proportionately. Standby rates should be designed to account for the stability that results when there are a number of DG facilities within a distribution system. This means that a 100% backup of all DG capacity simultaneously is both uneconomic and unnecessary, since it is improbable that a large fraction of all DG units will be off line simultaneously.

Interconnection costs have been examined as part of the extensive Rule 22 proceeding. The initial and supplemental review fees are established for investor owned utilities and so could at least be taken as an expected and determinate cost in project development. The costs of special studies for more complicated interconnections remain widely variable and relatively unbounded.

Note that the Rule 22 process addresses interconnection fees and charges for the investor-owned utility service territories; similarly the current CPUC proceedings may address standby and other rate issues for these utilities. Both sets of issues need to be addresses for non-CPUC jurisdictional utilities.

- Should a separate market structure be created for the full range of DG technologies (i.e., DG aggregation, DG Power Exchange, etc)?
No, the strongest promise offered by deployment of DG is as an integrated part of the interconnected utility grid. Separate market structures appear to mitigate against this goal and against customer price transparency for DG options as well. Aggregation programs for DG may be useful, such as the Aggregated Distributed Generation Pilot Program (ADGPP) proposed by the CA ISO, but this proposal is offered in the context of the existing market structure.
- Should regulatory rules be changed to support the development of microgrids?
Yes, as suggested by Mr. Marnay in his delivery at the February 5th workshop.
- Does the suspension of direct access impact the marketability of DG?
Yes. There are two aspects of direct access that need to be distinguished. The first, which is not at issue here, is that of wholesale competition in terms of power generation. The second aspect is that of customer control of/responsibility for commodity supply and, in conjunction with that, control over the "customer interface" with the utility service provider. Both DA and DG tend to empower the customer, and arguably DG is a subset of DA. Both call into question the necessity of the utility role as the exclusive retail provider of commodity electricity.
- Does the imposition of "exit fees" impact the marketability of DG?
Any imposition of costs upon a customer's action to meet its own electricity needs detracts from the economics of that enterprise.
- Should standards for control/communications be developed to better enable DG to participate in markets?

The existence of standards, allowing multiple participants to develop and install equipment on a common grid, is desirable. To the extent that such standards already exist, regulatory agencies should encourage their development; premature involvement in standard setting does run the risk of stifling technological innovation, however. Such standards should provide for an open architecture and allow for easy entry into the DG market. DGS suggests that market participants may be the best informed and positioned to develop and implement consensus standards.

- Should the DG market paradigm shift towards decentralized rather than centralized control?
Centralized control of system operations and dispatch has been necessary in the past for reasons of safety, reliability and system stability. To the extent that common protocols, operating and equipment standards can supplant the need for centralized control, this is desirable, in order to promote a more dispersed, robust and reliable electricity grid.

Potential Role of Government in Addressing Issues and Opportunities

Overview of Potential Roles

- **Plan/Coordinate:**
To maximize the potential benefits of distributed generation installations, coordination is essential. When DG units are placed in areas of congested distribution, they are assets to nearby customers in the form of increased reliability and to the utility in the form of averted capital outlay. However, this benefit can reach a point of diminishing returns, and that is why coordination is required. Because the involved parties have vested interests that bias their ability to make equitable decisions, the government seems the best agent to oversee the coordination of DG installations so that the public receives the most benefit.
- **Purchase:**
The State has undertaken a pilot program of DG development, utilizing a third party ownership model. State agencies have experience with both state-owned and third party owned cogeneration facilities located at state sites.
- **Be Entrepreneurial –** Government's role as an entrepreneur to promote DG can happen at two levels. At the first level, government is a member of a community of DG entrepreneurs. This community shares the tasks associated with promoting DG, such as inventing new DG technologies or refining existing ones, developing efficient manufacturing techniques, installing or constructing DG projects, and bringing financing to the table for DG products and projects. Government's specific role would be to either develop new processes regarding permitting and certification, or to streamline existing processes and leverage efficiencies to produce savings in cost and time. In addition, government plays an entrepreneurial role when public funds support R&D efforts or when government labs and research facilities are utilized to test or develop new DG technologies.

The second level of government entrepreneurship involves potential policies that could direct government facilities, and institutions to generate a percentage of their electrical needs on site, and require that some percentage of this on-site generation come from renewable or ultra-clean technologies. Existing facilities and institutions would determine the feasibility of installing various DG technologies at various load levels, which in the aggregate would contribute to achieving department and agency goals as specified by policy. The design and construction of new facilities would incorporate DG technology applications into the planning and development process.

Other possible roles for the government to engage in as an entrepreneurial agent include the sharing of resources with other public entities, the development of master service contracts for bulk equipment purchase and for developing and constructing DG projects, and the sponsorship of DG related training seminars, workshops, and conferences.